

Morphological Change of Unruptured Vertebral Artery Dissection on Serial MR Examinations

Evaluation of the Arterial Outer Contour by Basi-parallel Anatomical Scanning (BPAS)-MRI

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Summary

Basi-parallel anatomical scanning (BPAS)-MRI is a simple MRI technique to reveal the surface contour of the intracranial vertebrobasilar artery.

The purpose of this study was to investigate the usefulness of BPAS-MRI for observing the temporal course of unruptured vertebral artery (VA) dissection in patients by means of serial MR examinations. Since April 2003, we performed serial MR examinations in four patients with unruptured acute vertebral artery dissection. The frequency of the MR examinations during the follow-up period in each patient varied from twice within seven months to five times within 19 months. Both MRA and BPAS-MRI were obtained in each MR examination.

We investigated the course of morphological changes within the dissected artery on BPAS-MRI (outer contour) and on MRA (inner lumen).

Although the initial MRA showed fusiform dilatation, irregular stenosis or normal caliber at the dissected lesion, the initial BPAS-MRI disclosed fusiform dilatation in all of the four patients. In two patients, MRA finding of the VA lesion had changed, though the fusiform appearance had been stationary on BPAS-MRI. Then

both dissolution of the fusiform dilatation on BPAS-MRI and normalization of the inner luminal caliber on MRA were confirmed within nine months.

In one patient, fusiform dilatation on both BPAS-MRI and MRA resolved simultaneously on the MR examination at eight months after the initial symptom. In another patient, fusiform dilatation of the outer contour was still enlarging on BPAS-MRI ten months after the onset, though the fusiform dilatation on MRA had been stationary since the eighth week. We performed endovascular coil embolization in this patient eleven months after the initial symptom.

Resolution of the fusiform dilatation on BPAS-MRI should be a healing sign of VA dissection. Persisting the fusiform dilatation or progressively enlarging outer contour on BPAS-MRI may be an unstable sign. BPAS-MRI provides more information about the instability of the dissected lesion. We should obtain not only MRA but also BPAS-MRI for the course observation of unruptured VA dissection.

Introduction

Basi-parallel anatomical scanning (BPAS)-MRI is a simple MRI technique to reveal the surface contour of the intracranial vertebro-

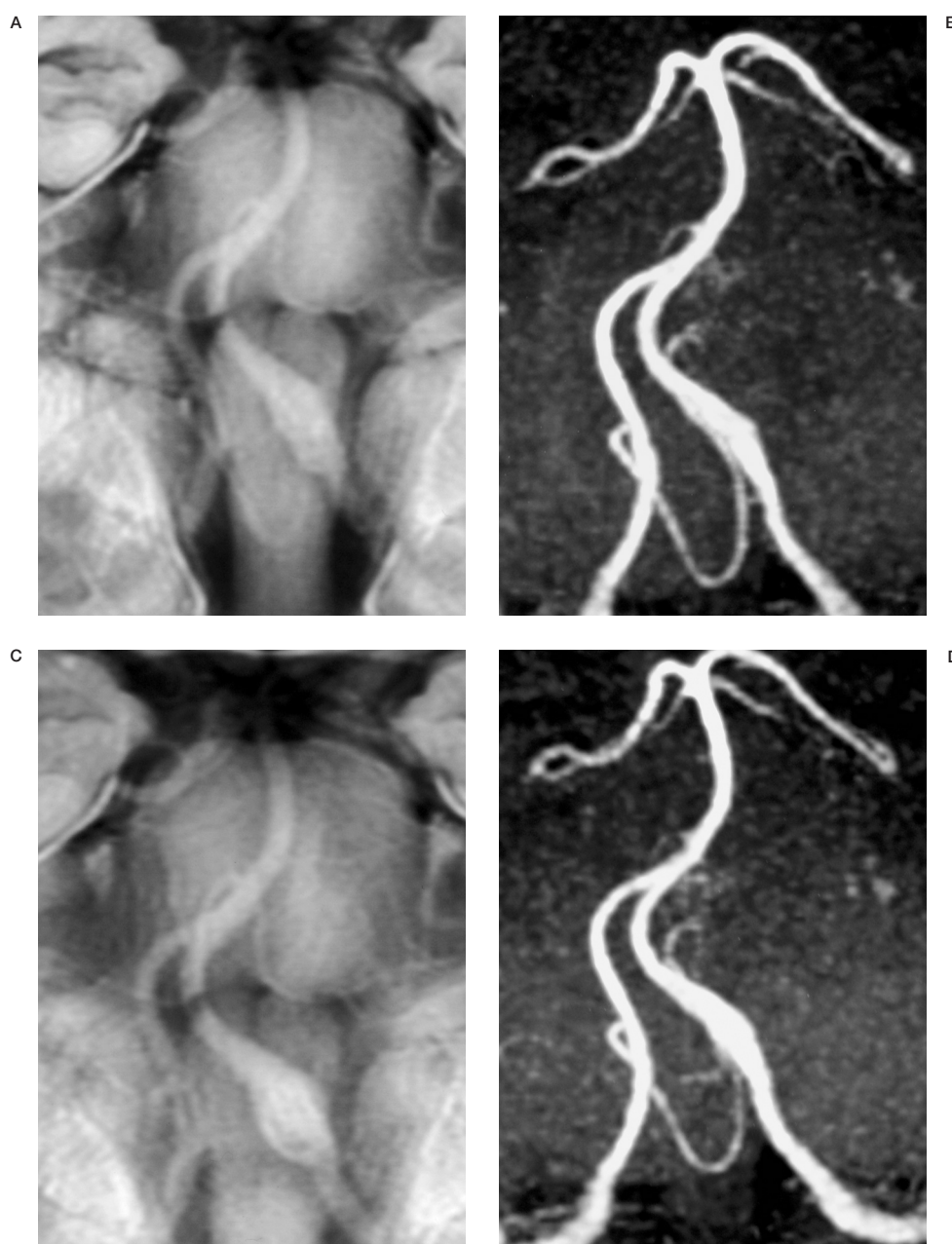


Figure 1 Case 1: 52-year-old male patient with left VA dissection. BPAS-MRI (A) and MRA (B) shows fusiform dilatation of the left VA at two months after onset. Ten months after the initial symptom, the patient complained of headache again. At that time BPAS-MRI (C) reveals enlarging fusiform appearance though the MRA (D) shows no remarkable change compared with prior study.

basilar artery¹. The vascular outer contour shown on BPAS-MRI is often different from the vascular inner luminal image on MRA. By comparing the BPAS-MRI with MRA, we can evaluate the vertebrobasilar lesion more precisely².

The purpose of this study was to investigate the usefulness of BPAS-MRI for observing the temporal course of unruptured vertebral artery (VA) dissection in patients by means of serial MR examinations.

Methods

Since April 2003, we performed serial MR examinations in four patients with unruptured of acute vertebral artery dissection. The number of the MR examinations performed during the follow-up period in each patient varied from three times within 14 months to five times within 19 months. Both MRA and BPAS-MRI were obtained in each MR examination. We investigated the course of morphological change

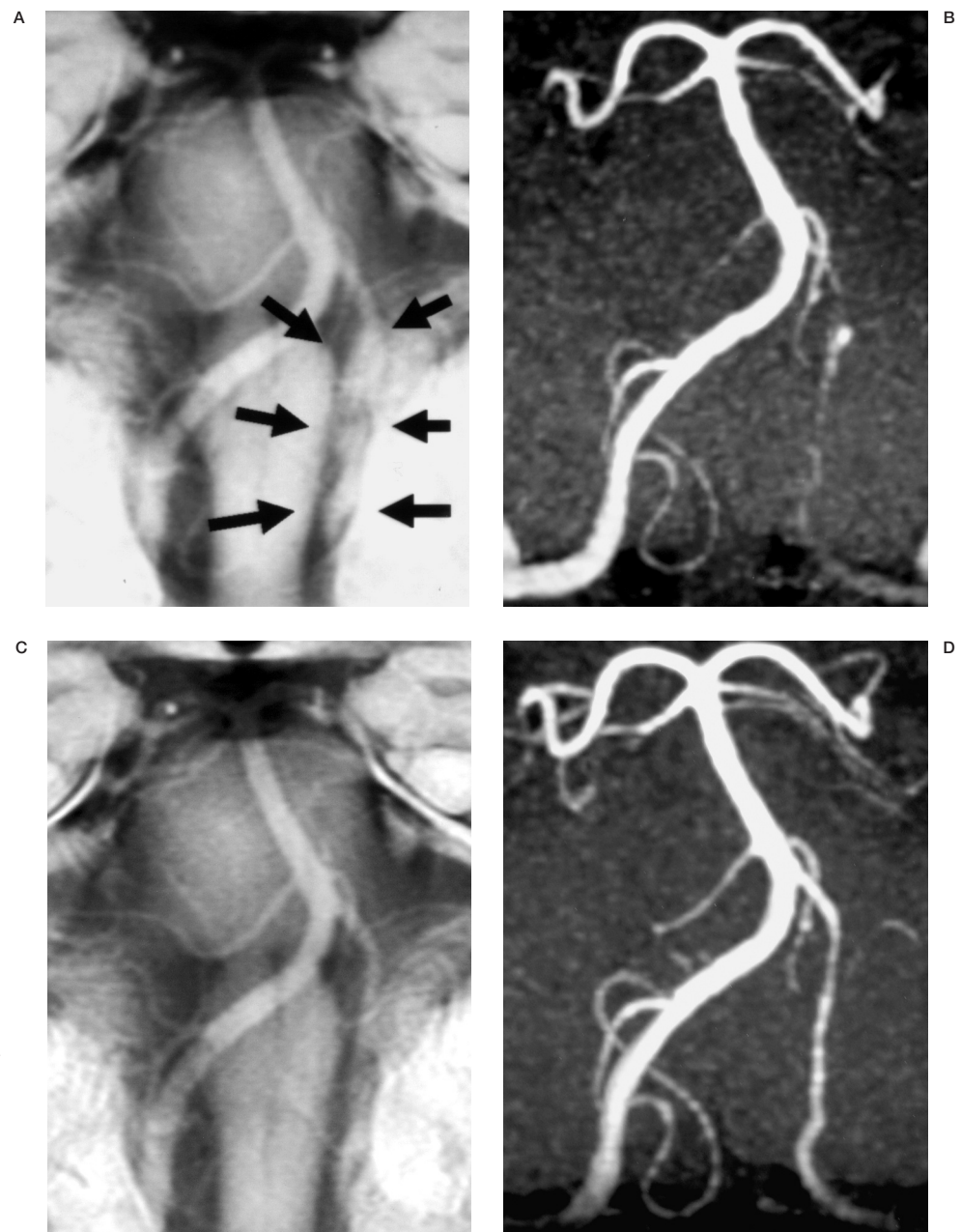


Figure 2 Case 2: 50-year-old male patient with left VA dissection. Initial BPAS-MRI (A) shows fusiform dilatation (arrows) of the left VA, though the MRA (B) indicates an irregularly narrowed left VA. Seven months after onset, BPAS-MRI (C) and MRA (D) show resolution of the fusiform appearance and the normalized inner caliber.

of the dissected artery on BPAS-MRI (outer contour) and on MRA (inner lumen).

Results

The morphological changes on both MRA and BPAS-MRI are summarized in table 1. Although the initial MRA showed fusiform dilatation, irregular stenosis (pearl and string appearance) or normal caliber at the dissected lesion, the initial BPAS-MRI disclosed fusiform dilatation in all of

the four patients. In two patients (Case 2, 3), MRA finding of the dissected lesion had changed, though the fusiform appearance had been stationary on BPAS-MRI. Then both dissolution of the fusiform dilatation on BPAS-MRI and normalization of the inner luminal caliber on MRA were confirmed within nine months.

In one patient (Case 4), fusiform dilatation on both BPAS-MRI and MRA resolved simultaneously on the MR examination at eight months after the initial symptom. In another

Table 1 Morphological changes on MRA / BPAS-MRI of the four patients.

Case #	age/sex	initial symptom	dissected vessel	initial-DSA finding	MR examinations (weeks/months after onset)				
					finding on MRA				
					finding on BPAS-MRI				
1	52/M	occipitalgia	left VA	FD retention of CM	0W	2W	2M	6M	10M
					FD	enlarging FD	←	←	←
					FD	enlarging FD	←	←	enlarging FD
2	50/M	Wallenberg syndrome	left VA	occlusion	0W	4W	7M	13M	19M
					P&S	occlusion	recanalized	←	←
					FD	←	normalized	←	←
3	52/M	Wallenberg syndrome	right VA	P&S	0W	2W	6W	3M	9M
					n.p.	←	stenosis	←	normalized
					FD	←	←	←	normalized
4	45/M	nape pain	left VA	FD retention of CM	6W		8M		14M
					FD		normalized		←
					FD		normalized		←

VA: vertebral artery FD: fusiform dilatation CM: contrast medium P&S: pearl and string appearance n.p.: nothing particular

patient (Case 1), fusiform dilatation of the outer contour was still enlarging on BPAS-MRI ten months after the onset, though the fusiform dilatation on MRA had been stationary since the eight week. We performed endovascular coil embolization in this patient eleven months after the initial symptom.

Discussion

The dissected segment always looked like a fusiform aneurysm on BPAS-MRI in our series. The fusiform dilatation of the vascular surface appearance should be a definite finding for the diagnosis of VA dissection, because the inner luminal findings of the acute VA dissection on MRA or DSA are variables. In our series, the dissected lesion on MRA could transform while the lesion kept the fusiform appearance on BPAS-MRI. Persisting fusiform dilatation or progressively enlarging outer contour on BPAS-MRI may be an unstable sign. Resolution of the fusiform dilatation on BPAS-MRI should be a healing sign of VA dissection.

Conclusions

BPAS-MRI provides more information about the instability of the dissected lesion. We recommend that not only MRA but also BPAS-MRI should be obtained to monitor the clinical course of unruptured VA dissection.

References

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